

Massimo Gregori Grgič

# Yacht Design Handbook



Serie di architettura e design  
**FRANCOANGELI**





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*To Giulia and Leonardo,  
beloved grandchildren.*



*Quelli che s'innamoran di pratica  
senza scienza son come l'nocchier  
ch'entra in navilio senza timone o  
bussola, che mai ha certezza di do-  
ve si vada\**

Leonardo da Vinci

*\* Those who fall in love with practice without science are like the helmsman who sails without rudder or compass, and never knows where he's going.*



## Foreword

First of all let me apologize to all the readers of this book for its language, which might sound somehow weird to the English-speaking. I managed to write this text in English, which is not my mother tongue, and I'm sure that I made several mistakes, some of them possibly funny. In any case I tried to stick to a language as plain as possible: at the end of the day this handbook is addressed to the very beginner.

Someone might wonder why I didn't entrust the version of this book to a professional translator. There are several reasons, but the main one is that only a vocational translator (not easy to spot), or the author himself, could render the technical parts. So: please forgive me and do focus on the content, not on the form.

This text follows two former books of mine, written in Italian and printed by the same Publisher in 2009. I wrote one of them (namely "Interior yacht design") four-handed, with the invaluable contribution of a co-author, professor Francesca Lanz. She took care of the priceless theoretical and cultural sections concerning the background of contemporary interior yacht design, which I have not included in this handbook, due to its inherently practical purpose.

The students of Yacht Design courses or masters come from all-over the world: in my recent classes I had very few Italians while the majority of the students were from Brazil, Spain, Greece, Romania, Germany, Lebanon, Turkey, Mexico, Uruguay, Chorea, China ... from everywhere. The only common language in this Babel is English, and this is the inspiring motivation for this handbook.

For the formulas I have decided to use the simple symbols of " \* " as a multiplier, " / " for divisions, # for "number".





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POLI.DESIGN of Politecnico di Milano runs a Yacht Design Master, called MYD, where I taught for several years: actually a large section of the original text is nothing else but the collection of the lecture notes that I wrote for my lessons. I wish to thank the Politecnico and professor Andrea Ratti for choosing this text. A considerable help to address this book on its road.

I'm grateful to Michele Stefano and Gianni Bani: they work with me side by side, took care of the figures, tables, charts, designed the book cover: their help was invaluable for the final result of the book.

Mss. Katia Forte is a professional translator: she lent a hand, having a quick (and yet qualified) look at the text, highlighting my worst mistakes. Many thanks.

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Some of the figures of this handbook are taken from existing yachts or from different marine industry builders catalogues. Thanks to all of them.

And I mainly wish to thank the readers of this book: this work would be useless without them.



# Chapter 1

## The hull design

### 1.1. Abstract

The word “hull” refers to the part of the ship made of the dead works, or topside (above the floating line, also called Load Water Line or LWL), and the quick works, or bottom (below the floating line). There are many types of hulls. The first and main difference is between merchant ships and pleasure crafts. I preliminarily wish to clarify that I use the words “ship” and “vessel” in an all-inclusive meaning: don’t just think of ocean liners. Among professional hulls there are cargoes, chemicals, gas, oil and containers carriers, ferries, tug boats, supply vessels, pilot and fishing boats (among which there are several different types). There are professional hulls for military purpose, from submarines to aircraft carriers. Pleasure crafts belong to a few categories, almost consistent according to their propulsion: sailing boats (racers or cruisers), motorsailers, motor vessels including displacing or semi displacing hulls and planning boats. This list only refers to single hull vessels: but we shouldn’t forget the existence of catamarans, trimarans and hovercrafts. Besides, there’s no precise border between one type and another: there are pleasure submarines, fishing boats or tug boats converted into super yachts and so on. Several books have been written about the sailboats design, and I won’t therefore care about those vessels. The books dedicated to motor boats design are fewer: and this is what this text tries to take care of.